

What is claimed is:

1. An isolated polynucleotide consisting of the nucleic acid sequence set forth in SEQ ID NO:1.

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2. An isolated polynucleotide comprising the nucleic acid sequence set forth in SEQ ID NO:1.

3. An isolated polynucleotide encoding a polypeptide

10 comprising the amino acid sequence set forth in SEQ ID NO:2.

4. An isolated polynucleotide encoding a polypeptide the sequence of which comprises the amino acid sequence of SEQ ID NO:2 with 0 to 50 conservative amino acid substitutions, wherein the polypeptide is a very long chain fatty acid acyl (VLCFA) CoA synthetase that converts a very long chain fatty acid to a thioester derivative.

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5. The isolated polynucleotide of claim 4, wherein the amino acid sequence comprises 0 to 30 conservative amino acid substitutions.

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6. The isolated polynucleotide of claim 4, wherein the amino acid sequence comprises 0 to 10 conservative amino acid substitutions.

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7. An isolated polynucleotide that hybridizes under stringent conditions to a polynucleotide comprising the nucleic acid sequence of SEQ ID NO:1, or complement

thereof, wherein the polypeptide is a very long chain fatty acid acyl (VLCFA) CoA synthetase that converts a very long chain fatty acid to a thioester derivative.

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- 10      a thioester derivative.
9. The isolated polynucleotide of claim 8 comprising a nucleotide sequence that is at least 90% homologous to the sequence of SEQ ID NO:1.
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- 20      11. An isolated polynucleotide comprising the nucleic acid sequence set forth in SEQ ID NO:1, wherein thymine is uridine.
- 25      12. An isolated polynucleotide comprising a sequence that encodes a polypeptide the amino acid sequence of which is at least 80% identical to the sequence of SEQ ID NO:2.
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14. The isolated polynucleotide of claim 12, wherein the amino acid sequence is at least 95% identical to the sequence of SEQ ID NO:2

5 15. A vector comprising the polynucleotide of claim 1, 2, 3, 4, 7, 8, 11 or 12.

16. The vector of claim 12, wherein the vector is an expression vector.

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17. The vector of claim 12, wherein the vector is a plasmid.

18. The vector of claim 12, wherein the vector is a viral vector.

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19. A host cell transformed with the vector of claim 12.

20. The host cell of claim 16, wherein the cell is a eukaryotic cell.

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21. The host cell of claim 16, wherein the cell is a prokaryotic cell.